

## THE GREAT SOUTHERN COMET

BY letters from Mr. Gill received by the mail leaving Cape Town on February 3, it appears that the large comet of which Dr. Gould telegraphed from Buenos Ayres was discovered, so far at least as regards a part of the tail, on February 1, from the west side of Table Mountain. Mr. Gill received information that a comet's tail "had been seen to set" from this quarter on the following afternoon, and the same evening the extreme portion of the tail was visible over the mountain from the Royal Observatory; by going a quarter of a mile south of the Observatory, the near shoulder of the mountain was cleared, and the tail, rapidly brightening, was traced further; it passed parallel to a line joining  $\beta$  and  $\delta$  Gruis, about  $10^\circ$  to W., but could not be traced beyond the former star. Mr. Gill thought the nucleus had set almost at sunset.

The following telegram has been received by the Academy of Sciences at Paris from the Emperor of Brazil, who takes a personal interest in the affairs of the Observatory at Rio Janeiro, which is in charge of M. Liais:—"Rio de Janeiro, 20 février, 1880. Deuxième note de Liais. Comète seulement observée 4 et 8. Renseignements; observations faites ailleurs. Approximativement, distance périhélie,  $0.05$  à  $0.10$ ; passage périhélie,  $11$ ; inclinaison,  $80^\circ$ ; longitude du nœud ascendant,  $120^\circ$ ; longitude du périhélie,  $85^\circ$ ."—PED. ALCANTARA."

If the time of perihelion passage is assumed February 11.5 G.M.T., and the perihelion distance  $0.075$ , with direct motion in the orbit, the comet's position on February 2 at 8h. 30m. mean time at the Cape would be in R.A.  $314^\circ$ , with  $22^\circ$  south declination; so that it would be distant only about  $5^\circ$  from the sun, thus confirming Mr. Gill's conjecture as to the position of the nucleus, but unless the comet became very rapidly fainter, after perihelion, it is difficult to explain with the above elements, its not being observed in Europe.

The last great comet which was observed in the southern hemisphere without becoming visible in these latitudes was that of January, 1865, which had also a small perihelion distance with large inclination; this comet was north of the ecliptic less than twenty-eight hours. It became suddenly visible in Tasmania, near the western horizon, on January 17, and was observed until the last week in March. The best orbit is that given by Mr. Tebbutt, from his own observations at Windsor, N.S.W. (*Astron. Nach.*, No. 1541).

## GEOLOGICAL NOTES

A LITTLE pamphlet under the title of "Mélanges géologiques," by MM. Cogels and Baron van Ertborn, has just appeared at Antwerp, in which some interesting new facts are given respecting the post-tertiary formations of Belgium. Much controversy has for a long time been carried on as to the relative positions of some of the quaternary deposits of that country. The "Sables campiniens" and the "Limon hesbayan" were regarded by Dumont as of contemporaneous origin, albeit he placed the Limon above the Sables in the legend of his geological map of Belgium. D'Omalus d'Halloy and M. Dewalque ranged the Hesbayan mud above the Campinian sands and gravels. MM. Winkler, Cogels, and Van den Broeck, on the other hand, have concluded the reverse to be the more probable order. But in no case had the true order of succession been observed in any actual section. This question, which might have been answered long ago by a few shallow borings, appears to have been recently settled in this way by the gentlemen above named. They have found that at Menin and Courtrai, places some ten kilometres apart, the same order of sequence is observable, and that in each case the yellow sands of the Campinian series overlies the yellow and grey mud with *Cyclas*, *Pupa*, *Lymnaea*, &c., forming the Hesbayan zone.

THE same authors have in a similar manner fixed the horizon of the deposit from which were obtained the numerous bones of the mammoth found in 1860, the more perfect of which form so imposing a part of the remarkable collections in the Brussels Museum. According to their reading of the data the following is the section at Lierre:—

	Metres.	
Sands with gravelly base ...	5'30	Campinian.
Peaty sand and peat ...	0'70	Fluvatile Quaternary
Black glauconitic sand ...	0'60	(containing the mam-
Gravelly glauconitic sand ...	0'70	moth bones).
Argillaceous glauconitic green sand ...	0'10	Antwerpian (sands with <i>Panopæa menardi</i> ).

The sands containing *Panopæa menardi* and *Pectunculus pilosus*, which MM. Cogels and Ertborn include in their widely distributed "Antwerpian" group were evidently succeeded in the Lierre district by a wide marsh which must have been a favourite haunt of the mammoth and its contemporaries. Arranging the geological formations of the neighbourhood of Antwerp in chronological order these writers regard them as capable of the following subdivisions:—

Folder clay ... ..	...	...	...	...	...	...	Recent.
Stratified sand with derivative fossils ... ..	...	...	...	...	...	...	
Peat ... ..	...	...	...	...	...	...	
Grey clay ... ..	...	...	...	...	...	...	
Peaty black clay ... ..	...	...	...	...	...	...	
White sand ... ..	...	...	...	...	...	...	Quaternary.
Sand ... ..	...	...	...	...	Upper	Campinian.	
Massive argillaceous sand ... ..	...	...	...	...	Lower		
Stratified sands and clays ... ..	...	...	...	...			
Gravel and shell <i>débris</i> ... ..	...	...	...	...	...	Fluvatile Quaternary.	
Stratified sands and sandy clays ... ..	...	...	...	...	...		
Peat and peaty clay ... ..	...	...	...	...	...		
Various sands with broken and rolled shells, bones <i>in situ</i> or rolled ... ..	...	...	...	...	...	Lower Quaternary.	
Sandy clay with marine shells, gravels, pebbles, and large rolled fragments ... ..	...	...	...	...	...		
E. Pure or argilla- ceous green sand	Sands with <i>Trophon antiquum</i> .	Scaldestan.	Pliocene.	Sands with <i>Isocardia cor.</i>	Diestian.	Tertiary.	
D. Sands with <i>Cor- bula striata</i> ...							
C. Upper shell-bed							
B. Middle sands "	Sands with <i>Terebratula grandis</i> .	Diestian.					
A. Lower shell-bed							
Bluish-grey glauco- nitic sand ... ..	Sands with <i>Pectunculus pilosus</i> .	Antwerpian.	Miocene.				
Gravels ... ..							
Glauconitic sand ...	Sands with <i>Panopæa menardi</i> .	Antwerpian.	Miocene.				
Black glauconitic sand ... ..							
Green or black glauconitic sand, pure or argilla- ceous ... ..	Sands with <i>Panopæa menardi</i> .	Antwerpian.	Miocene.				
Do, with or without fossils, scattered gravels ... ..							
Bluish-grey fossil- iferous argilla- ceous sand, glau- conitic black sand ... ..	Sands with <i>Panopæa menardi</i> .	Antwerpian.	Miocene.				
Gravels, and large rolled blocks ...							
Boom clay ... ..	...	...	...	Rupelian ...	Oligocene.		

In a recent communication to the Royal Geological Society of Cornwall Mr. J. H. Collins continues his observations on the existence of Lower Silurian rocks in Cornwall, and shows that they cover a much larger area than has been supposed. He has found remains of *Orthis* in the quartzite of Manaccan like those already known from the quartzite of Carn Gowan. He is engaged in a microscopical and chemical investigation of the hornblende-rock and serpentine of the same district, and is disposed to regard these masses as highly altered Lower Silurian stratified rocks.

PROF. MARSH chronicles the discovery of a new species of *Sauranodon* from the upper Jurassic series of Wyoming. Since the first discovery of the genus by him eight additional specimens have been obtained, enabling him to distinguish two species (*S. natans*, the original form, and *S. discus*) and to throw considerable light on the limbs of this interesting type of mesozoic reptile which he regards as presenting an earlier stage of differentiation than *Plesiosaurus* and *Ichthyosaurus*.

UNDER the name of Titanomorphite, A. von Lasaulx describes a new lime-titanate from the gneiss of the Eulengebirge. It forms a fibrous granular aggregate surrounding kernels of rutile or titanite iron, of which it must be regarded as an alteration-pro-

duct. Its theoretical composition he gives as—titanic acid, 74.55; lime, 25.45; or  $\text{CaO}$ ,  $2\text{TiO}_2$ .

IN his recent annual address to the "Geologische Reichsanstalt" at Vienna, Ritter von Hauer gives some interesting particulars regarding the steps that have been taken to investigate the geological structure of Austria's last territorial acquisition. On the occupation of Bosnia and Herzegovina, the Government requested the director of the Reichsanstalt to make a geological reconnaissance of these provinces, which had formed until that time an almost totally unknown tract of Europe, though their area at least equalled that of Bohemia and Saxony combined. Their rough mountainous character and want of means of communication and transit made the task by no means a light one. An original plan of co-operation with the Geological Survey of Hungary had to be abandoned on account of the want of disposable force in that service, and the work was accordingly undertaken by three members of the Austrian Survey, Messrs. Mojsisovics, Tietze, and Bittner, with some assistance from Prof. Pilar of Agram, and from previous labours of M. Paul in the saliferous region of Tuzla. As the result of this reconnaissance, an outline geological map of Bosnia and Herzegovina has been prepared on the basis of the sheets of the map of Central Europe issued by the Austrian Military Geographical Institute on the scale of 1:100,000. Eighteen tints of colour are employed, and with these are shown Alluvium and Diluvium, Calcareous tuff, Sarmatian, Marine and Freshwater Neogene, Trachyte, Flysch (Younger Flysch-sandstone, Nummulite-limestone, and limestone of the Flysch zone), Eruptive rocks of the Flysch-zone (Serpentine and Gabbro), Chalk-limestone, Jurassic Aptychus-limestone, Jura-limestone, Triassic (principally limestone and dolomite), Werfen shales, Red sandstones and quartzites, Palæozoic shales, sandstones, and limestones, and granite. The map is being reduced to the same scale as von Hauer's well-known and most useful general geological map of the Austrian-Hungarian Monarchy, and will soon be published by Hölder of Vienna, as a supplement to that work.

### PHYSICAL NOTES

PROF. O. N. ROOD communicates to the current number of the *American Journal of Science* a new method of studying the reflexion of sound waves. The "tremolo" effect in some American organs is obtained by a revolving fan. Prof. Rood conceives that the alternations of loudness in the sound produced by this fan are not due, as is commonly supposed, to the fluctuations of air-currents which it produces, but to the rapid alternations of reflexion and non-reflexion at its surface. A disk of zinc having sectors cut out of it, rotating in its own plane, yielded similar results. Using such disk as a reflector, when rotating at from two to four revolutions per second, and observing the intensity with which these alternations are produced, Prof. Rood obtains some interesting results. At a perpendicular incidence the short sound-waves are more copiously reflected than those that are longer, and the regular reflexion is more copious from large than from small surfaces. When the sound-waves fall upon small plane surfaces at an acute angle, the reflexion is most copious in the same direction as with a ray of light, but the reflected and inflected waves can be traced all around the semicircle. The reflexion being more intense for waves of short wave-length, the components of a composite sound-wave are not all equally copiously reflected at the same angle. The reflexion of sound from very small surfaces is easily demonstrated by this method. Qualitative comparisons between the power of different substances to reflect sound can easily be made by this method. Thus a disk of cardboard in which the open sectors are covered with filter-paper gives alternations owing to the difference in reflective power between the zinc and the filter paper.

QUICKSILVER may be readily frozen by placing a small quantity of it along with anhydrous ether in the decanter used for freezing water of a Carré's freezing-machine, and exhausting in the usual manner. This experiment is due to M. de Waha.

PROF. COLLADON of Geneva, has been studying the instrument invented by Rhodes, of Chicago, and named the audiphone, whose purpose is to aid the deaf in hearing. The newest form of this instrument, as imported from America, consists of a thin flexible sheet of hard ebonite rubber, provided with a handle like a palm-leaf fan, and with a cord which can be tightened at pleasure to curve it into the form of a semi-cylinder. The edge of the sheet is pressed against the upper set of teeth, as

described in a recent "Note," the convex surface being outwards, and so the vibrations impinging upon the sheet are transmitted through the teeth and bones of the skull to the auditory nerve. Prof. Colladon finds that the sheet of ebonite may be advantageously replaced by a sheet of fine elastic cardboard, the best kind being that smooth, dense variety known to the trade as *shalloon* board or satin board (*carton d'orties*). This card audiphone costs but a trifling fraction of the ebonite article, and is on all hands admitted to yield a better result. Some experiments conducted in January by M. Colladon and by M. Louis Sager upon deaf-mutes leave no doubt of the existence of cases in which, while the ordinary hearing-trumpet fails, the audiphone is successful. M. Colladon mentions the case of a professional singer who had been deaf for fourteen years, to whom the audiphone of cardboard brought back once more the power of hearing the music of a piano. It is an interesting point in M. Colladon's observations that persons deaf-mute from birth evinced emotions of a pleasurable nature on thus hearing music for the first time.

THE variations of the refraction-constant with elevation above the earth's surface have recently been studied by Herr von Sterneck (*Sitzungsber.* of Vienna Academy, vol. lxxx. div. 2), who took measurements (mostly by day and only in calm weather) of the zenith distances of stars of known declination, at eleven different stations in Styria, Upper Austria, and Bohemia, with various heights up to 2,500 m. The meteorological conditions were carefully recorded. The values of the refraction-constant  $\alpha$  calculated from these observations, tabulated with the meteorological data, are compared with the values  $\alpha'$  deduced from Bessel's refraction-constant at  $0^\circ$  temperature and 760 mm. air-pressure. The differences are in general not great, but seem to have a certain regularity. The author finds neither the height of the place of observation, nor the temperature, related to these differences, but the conditions of *moisture* seem to be intimately connected with them. If this connection be represented graphically, it is found that, in general, a moister atmosphere corresponds to the positive differences  $\alpha - \alpha'$ , than to the negative. Taking these differences as ordinates, the psychrometric differences as abscissæ, the points form almost a straight line, which cuts the axis of abscissæ at about  $4^\circ$  psychrometric difference. Hence the values deduced from Bessel's constant agree with the observed only with a psychrometric difference of  $4^\circ$ ; with a smaller difference they are less, with a greater, greater. While not giving these results as absolutely decisive, the author thinks they should awaken some interest, as several phenomena known to observers seem to point to an influence of moisture on refraction, too much neglected, since Laplace affirmed it to be quite insignificant.

O. E. MEYER has recently shown, by careful measurement of the intensity for different groups of rays of the spectrum, that ordinary daylight contains relatively a greater proportion of red and yellow rays, and a less proportion of blue and violet rays than the direct light of the sun.

NEWTON denoted by the name of "indigo" the tint of the spectrum lying between "blue" and "violet." Von Bezold, in his work on colour, rejects the term, justifying his objection by observing that the pigment indigo is a much darker hue than the spectrum tint. Prof. O. N. Rood, who follows von Bezold in rejecting the term, brings forward the further objection that the tint of the pigment indigo more nearly corresponds in hue (though it is darker) with the cyan blue region lying between green and blue. By comparing the tints of indigo pigment, both dry and wet, with the spectrum, and by means of Maxwell's disks, it appears that the *hue* of indigo is almost identical with that of Prussian blue, and certainly does not lie on the violet side of "blue." Indigo in the dry lump, if scraped, has, however, a more violet tint; but if fractured or powdered, or dissolved, its tint is distinctly greenish. Prof. Rood considers that artificial ultramarine corresponds much more nearly to the true tint of the spectrum at the point usually termed "indigo," and he therefore proposes to substitute the term "ultramarine" in its place, the colour of the artificial pigment being thereby intended.

PROF. W. F. BARRETT has recently come to the conclusion that the phenomenon of the Trevelyan "rocker," which has been hitherto regarded as produced by the rapid expansion and contraction of the metals in contact, is due rather to the action of a polarised layer of gas between the hot and cold surfaces like that existing between the hot and cold surfaces of the layer of vapour supporting a drop of liquid in the spheroidal state,